INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE

MODE-PP TeX: A GRM/GDMO Pretty Printing Library based on MODE-FE for the Generation of TeX Documents. -Release 1.0- Reference Manual

Olivier Festor

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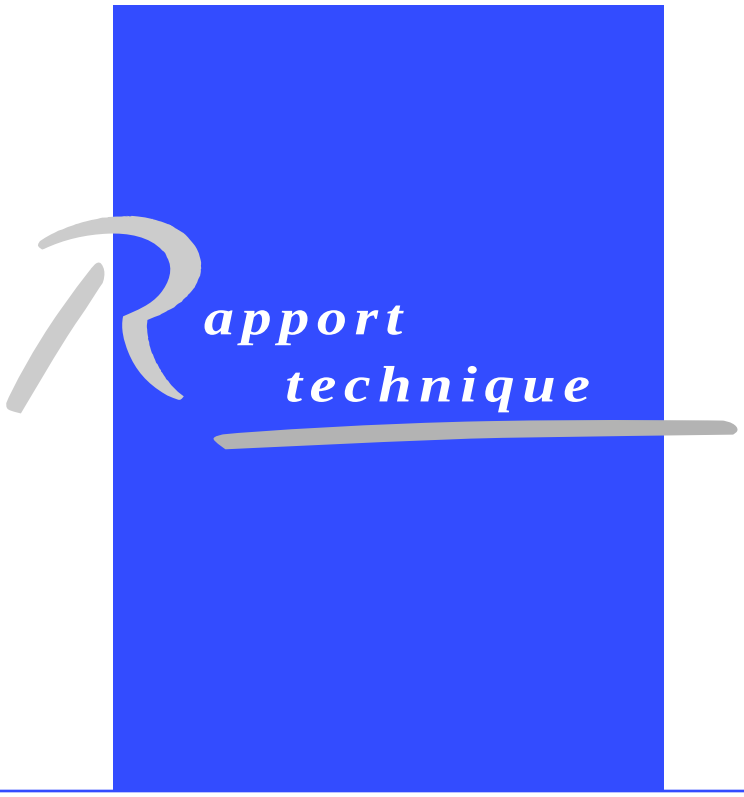
PROGRAMME 1



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MODE-PP TeX: A GRM/GDMO Pretty Printing Library based on MODE-FE for the Generation of TeX Documents. -Release 1.0- Reference Manual

Olivier Festor

Programme 1 — Architectures parallèles, bases de données, réseaux et systèmes distribués
Projet RESEDAS

Rapport technique n ° 0192 — Avril 1996 — 17 pages

Abstract: MODE-PP TeX (MODE TeX Pretty-Printer) is a module which allows formatting and pretty printing of GRM (General Relationship Model) and GDMO (Guidelines for the Definition of Managed Objects) specifications. The tool allows the generation of one or more TeX files which contain formatted specifications according to different document style constrains.

MODE-PP TeX is part of the MODE (Managed Object Development Environment) prototype which is developed for integrating the use of Formal Description Techniques in an environment for building Management applications. MODE-PP TeX is built on top of MODE-FE and is provided as a library. This document is the reference manual for release 1.0 of the MODE-PP TeX library and its API.

Key-words: GDMO, GRM, MODE, TeX, Reference Manual

(Résumé : tsvp)

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MODE-PP TeX: Un formateur GRM/GDMO basé sur MODE-FE pour la génération de documents TeX
-Version 1.0-
Manuel de référence

Résumé :

MODE-PP TeX (MODE TeX Pretty-Printer) est un module de formatage de spécifications GRM (General Relationship Model) et GDMO (Guidelines for the Definition of Managed Objects). Il permet de générer un ou plusieurs fichiers TeX comportant des specifications formatées suivant plusieurs canevas.

MODE-PP TeX est une application de l'environnement MODE développé pour intégrer l'utilisation des méthodes de description formelle dans le développement d'applications de gestion de réseaux. MODE-PP-TeX est construit sur la librairie MODE-FE. Il est disponible sous forme d'une librairie. Ce document forme le manuel de référence de la version 1.0 de la librairie MODE-PP et de son interface de programmation.

Mots-clé : GDMO, GRM, MODE, TeX, Manuel de Référence

Chapter 1

Introduction

This document forms the reference manual of the **MODE-PP TeX** (release 1.0) part of the MODE environment. MODE stands for **Managed Object Development Environment** and is a research prototype under development within the RESEDAS research group of the INRIA Lorraine and CRIN/CNRS. The MODE environment is designed for supporting various developments based on latest OSI standards for Management Information Modelling combined with Formal Description Techniques.

The MODE-PP (MODE Pretty-Printer) is built on top of the MODE-FE Library [Festor 96]. MODE-PP provides formatting and pretty-printing facilities for both GRM (General Relationship Model) [CCITT.X.725 95] and GDMO (Guidelines for the Definition of Managed Objects) [ISO-10165.4 92] specifications. MODE-PP TeX is the TeX generator provided in the MODE-PP library.

Mode-PP is distributed with Mode-FE **FREELY** under the **COPYRIGHT** conditions as described in the `COPYRIGHT` file provided with the package. MODE is not a closed environment, nor it is a commercial one. Even if stable and complete, it aims at allowing people to experiment new features in Management Information Modelling.

Within this document, the features of the MODE-PP TeX generator are presented and the API detailed.

The remainder of this document is organised as follow. Chapter 2 provides an overview of the TeX generator's features. This overview is followed by a a detailed description of the MODE-PP TeX generator and its use.

After some samples which illustrate some generated specifications, the document gives some information on contact and copyright concerning the MODE tool-set. The document is completed with a conclusion and a presentation of planned extensions (chapter 7). In an appendix, the reader will find a detailed description of the Application Programming Interface provided within the MODE-PP TeX as well as an example of its use.

Chapter 2

MODE-PP TeX overview

The MODE-PP TeX generator is the first application module built over the MODE-FE toolkit. It uses the internal representation of specifications loaded with MODE-FE and provides TeX generation methods for several specifications and/or style types.

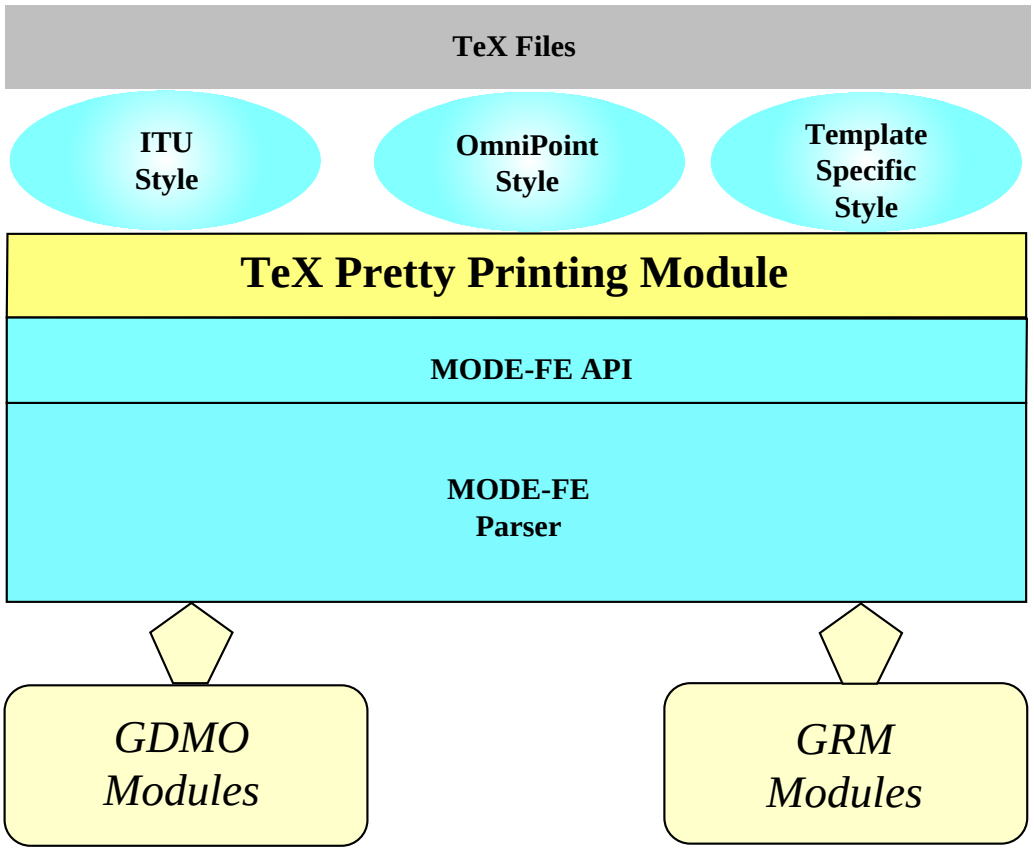

Figure 2.1: The MODE-PP Library and the TeX Generator: link to MODE-FE

The MODE-PP TeX printer offers several facilities for selecting in a very flexible way the style to which the specifications must conform. Several options are provided for this and generated TeX files are very easily integrated into any other documents. The TeX printer is provided as part of the MODE-PP library and thus provides an API allowing its integration in any other applications.

Chapter 3

Package Description, installation and usage

The TeX printer is provided as part of the MODE-PP library which provides several other pretty-printing facilities for GRM and GDMO specifications. The MODE-PP Library is provided as part of the MODE distribution. In its first release, the library is provided as an object code. Refer to the MODE-FE document for installation.

The full TeX printer is defined in the MODE-PP library as one C++ class with many public printing methods. These methods are detail-led in the appendix of the document. Each method is parameterised by the stream to which the output must be directed and a pointer to an object which contains the representation of the template(s) for which the method contains the TeX generator code.

Using the TeX Printer requires:

- including all Mode-FE related files,
- including the ModePP_TexPrinter.hh file in your program,
- having an instance of the parser, the repository and the message printer,
- having an instance of the pretty printer class,
- linking your applications with both the ModeFE and the ModePP libraries.

The code below illustrates the instantiation and a call to the generation of a TeX file corresponding to a module previously parsed by the ModeFE parser.

```
// Sample Parser and module printer
#include <stdio.h>
#include <iostream.h>
#include <fstream.h>
#include "ModeFE_AllClasses.hh"
#include "ModeFE_Grammar.bison.tab.h"
#include "ModePP_TexPrinter.hh"
#include "ModePP_HTMLPrinter.hh"
#include "ModeFE_MessagePrinter.hh"

extern char* strcopy(char*);
extern "C" int strcasecmp(const char *, const char * );

parse Parser;                                   // Parser instanciation
ModeFE_Repository repository;                   // Repository instanciation
ModeFE_MessagePrinter messagePrinter;           // message printer instanciation

int main(int argc, char **argv)
{
 FILE *fp;
```

```
char* filename;
char* outfile;
ModePP_TexPrinter ptex;
ModePP_HTMLPrinter pout;
int erreur;
if (argc ≤ 3)
  {
    cout ≪ endl ≪ endl ≪ "Usage:  Main <grm-gdmo-file-name> -o <output-TeX-file> [-B]" ≪ endl ≪ endl;
    exit(1);
  }
else
  {
    filename = strcopy(argv[1]);
    if (strcasecmp(argv[2],"-o") ≠ 0)
      {
        cout ≪ endl ≪ "Usage:  Main <grm-gdmo-file-name> -o <output-TeX-file> [-B]" ≪ endl ≪ endl;
        exit(1);
      }
    else
      {
        outfile = strcopy(argv[3]);
        if ((fp = freopen(filename,"r",stdin)) == NULL)
          return ERROR ;
        else
          {
            if ((erreur = Parser.yyparse()) == 0)                                    // Parser call
              {
                ofstream OutFile ( outfile, ios::out );
                cout ≪ "Parsing was Sucessful !!!" ≪ endl;

                const ModeFE_Module* res = (repository.CGetModules())→CGetElement();    // module access
                ptex.PrintOSITexModule(&OutFile, res);                               // TeX Printer call

              }
            else
              {
                cout ≪ "Parsing was unsuccessful !!!" ≪ endl;
                cout ≪ "...You should look at you GRM/GDMO specification!!" ≪ endl;
              };
            fclose(fp);
          }
      }
  }
 cout ≪ "Thanks for having used MODE-FE !\n\n\n\n";
};
```

Chapter 4

Generation samples

This chapter provides examples of generated TeX output for every type of template. This example is an excerpt from the TeX file generate for the M.3100 standard [CCITT.M.3100 92], the OSI Generic Management Information Model and the Definition of Management Information [ISO-10165.5 92, ISO-10165.2 92] and internal relationship specifications.

Start Generated TeX

Managed Object Classes

network **MANAGED OBJECT CLASS**
DERIVED FROM
"CCITT Rec. X.721 (1992) — ISO/IEC 10165-2 : 1992":top;
CHARACTERIZED BY
networkPackage;
CONDITIONAL PACKAGES
userLabelPackage **PRESENT IF** "an instance supports it";
REGISTERED AS {*ccitt recommendation m(13) gnm(3100) informationModel(0) managedObjectClass(3) 1* } ;

Packages

alarmSeverityAssignmentProfilePackage **PACKAGE**
BEHAVIOUR
alarmSeverityAssignmentProfileBehavior;
ATTRIBUTES
alarmSeverityAssignmentProfileId **GET** ,
alarmSeverityAssignmentList **GET-REPLACE ADD-REMOVE** ;
;

Attributes

alarmSeverityAssignmentList **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.AlarmSeverityAssignmentList ;
BEHAVIOUR
alarmSeverityAssignmentListBehaviour;
REGISTERED AS {*ccitt recommendation m(13) gnm(3100) informationModel(0) attribute(7) 3* } ;

...

Actions

addTpsToGTP **ACTION**

RT n ° 0192

BEHAVIOUR
addTpsToGtpBehaviour;
MODE CONFIRMED ;
WITH INFORMATION SYNTAX ASN1DefinedTypesModule.AddTpsToGtpInformation;
WITH REPLY SYNTAX ASN1DefinedTypesModule.AddTpsToGtpResult;
REGISTERED AS {*ccitt recommendation m(13) gnm(3100) informationModel(0) action(9) 1* } ;

Behaviours

removeTpsFromTpPoolBehaviour **BEHAVIOUR**
DEFINED AS "This action is used to remove termination points from termination point pools. Removing the last termination point from a pool has the effect of deleting the TP Pool object. If the TP pool is deleted, the name of the TP Pool will be sent back in the ACTION reply.";

Name-Bindings

alarmSeverityAssignment-managedElement **NAME BINDING**
SUBORDINATE OBJECT CLASS
alarmSeverityAssignmentProfile **AND SUBLCASSES**;
NAMED BY SUPERIOR OBJECT CLASS
managedElement **AND SUBLCASSES**;
WITH ATTRIBUTE
alarmSeverityAssignmentProfileId;
CREATE WITH-REFERENCE-OBJECT , **WITH-AUTOMATIC-INSTANCE-NAMING** ;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS ;
REGISTERED AS {*ccitt recommendation m(13) gnm(3100) informationModel(0) nameBinding(6) 1* } ;

Relationship Classes

generalCompositionRelationship **REPLATIONSHIP CLASS**
BEHAVIOUR
generalCompositionRelationshipBehaviour;
SUPPORTS
ESTABLISH establishGeneralComposition,
TERMINATE terminateGeneralComposition;
ROLE compositeRole
PERMITTED-ROLE-CARDINALITY-CONSTRAINT GRMExample.OneToOne
REQUIRED-ROLE-CARDINALITY-CONSTRAINT GRMExample.OneToOne
REGISTERED AS {*GRMExample . grmEx-Role x* }
ROLE componentRole
PERMITTED-ROLE-CARDINALITY-CONSTRAINT GRMExample.OneToMax
REQUIRED-ROLE-CARDINALITY-CONSTRAINT GRMExample.OneToOne
BIND-SUPPORT bindComponent
BIND-SUPPORT unbindComponent
REGISTERED AS {*GRMExample . grmEx-Role x* }

;
REGISTERED AS {*GRMExample . grmEx-RelationshipClass x* } ;

Relationship Mappings

symmetricRelationshipMapping **REPLATIONSHIP MAPPING**
REPLATIONSHIP CLASS symmetricRelationship;
BEHAVIOUR
symmetricRelationshipMappingBehaviour;
RELATIONSHIP OBJECT symmetricRelationshipObject
; **ROLE** peerRole **RELATED-CLASSES** "CCITT Rec. X.721 — ISO/IEC 10165-2":top
REPRESENTED BY
RELATIONSHIP-OBJECT-USING-POINTER peer

; **OPERATION MAPPING**
ESTABLISH establishSymmetricRelationship
MAPS-TO-OPERATION
CREATE OF RELATIONSHIP OBJECT
TERMINATE terminateSymmetricRelationship
MAPS-TO-OPERATION
DELETE OF RELATIONSHIP OBJECT
ESTABLISH querySymmetricRelationship
MAPS-TO-OPERATION
GET peerPointer **OF RELATIONSHIP OBJECT**
REGISTERED AS {*GRMExample . grmEx-RelationshipMapping x* } ;

Notifications

attributeValueChange **NOTIFICATION**
BEHAVIOUR
attributeValueChangeBehaviour;
WITH INFORMATION SYNTAX Notification-ASN1Module.AttributeValueChangeInfo;
AND ATTRIBUTE IDS
sourceIndicator sourceIndicator,
attributeIdentifierList attributeIdentifierList,
attributeValueChangeDefinition attributeValueChangeDefinition,
notificationIdentifier notificationIdentifier,
correlatedNotifications correlatedNotifications,
additionalText additionalText,
additionalInformation additionalInformation;
REGISTERED AS {*joint-iso-ccitt ms(9) smi(3) part2(2) notification(10) 1* } ;

Attribute Group

state **ATTRIBUTE GROUP**
DESCRIPTION "This is defined as an empty attribute group. The elements of this group are composed of state attributes in the managed object. The state attributes may include those specified in CCITT Rec. X.731 — ISO/IEC 10164-2 and others that are specific to the managed object class.";
REGISTERED AS {*joint-iso-ccitt ms(9) smi(3) part2(2) attributeGroup(8) 1* } ;

Parameters

miscellaneousError **PARAMETER**
CONTEXT SPECIFIC-ERROR ;
WITH SYNTAX Parameter-ASN1Module.MiscellaneousError;
BEHAVIOUR
miscellaneousErrorBehaviour;
REGISTERED AS {*joint-iso-ccitt ms(9) smi(3) part2(2) parameter(5) 1* } ;

End Generated TeX

Chapter 5

Copyright & Contact

5.1 Contact

The MODE toolkit is still under development. Several back-ends for MODE are either in development phase or β-test and some improvements to access the repository will be available in a very short time.

We are maintaining the MODE toolkit. So feel free to send us comments, bug reports. We will do our best to provide a stable and usage friendly tool.

Please send:

- bug reports,
- comments,
- any suggestions,

to one of the authors. We will respond in the shortest delay.

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A WWW page is maintained for MODE. The URL is:

http://www.loria.fr/exterieur/equipe/resedas/MODE.html

On this page you will find all new libraries developed for the the tool, new accessible applications, documentation, technical reports and white papers concerning planned extensions. You will also find many links to other network management pages from general information to companies which provide products for OSI and Internet Management.

5.2 Copyright

Chapter 6

Conclusion

In this report, we have presented the TeX generation module of the MODE toolkit. This module is built over the Mode-FE parser and allows formatting of GRM and GDMO specifications. The module is in its first release still a prototype and may contain some minor errors. Future releases of the module may be provided but are not planned yet.

Chapter 7

Planned extensions

Several extensions are planned for the MODE-PP library. Not all are definitively retained yet. Within these extensions we already identified:

- **Specification comments treatment and "As is" formatted printing:** We are currently extending the parser in a way that the comments written in a row GRM or GDMO specification are kept in the parser and a pretty printer for raw specifications (with comments and in-line specifications) is under development.
- ...

No major extentions except those described above are planned for the TeX printing module of ModeFE.

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[Festor 96] O. Festor, E. Nataf et L. Andrey. "MODE-FE: A GRM/GDMO Parser and its API -Release 1.0- Reference Manual". Technical Report no. 0190, INRIA Lorraine, 1996.

[ISO-10165.2 92] International Organization for Standardization (ISO), *"Structure of Management Information - Part 2: Definition of Management Information"*, International Standard, ISO-10165.2, January 1992.

[ISO-10165.4 92] International Organization for Standardization (ISO), *"Structure of Management Information - Part 4: Guidelines for the Definition of Managed Objects"*, International Standard, ISO-10165.4, January 1992.

[ISO-10165.5 92] International Organization for Standardization (ISO), *"Structure of Management Information - Part 5: Generic Management Information"*, International Standard, ISO-10165.5, January 1992.

Appendix A

The API

Following methods are offered by any instance of a ModePP_TexPrinter class.

ModePP_TexPrinter(**int**);

Basic constructor for the TeX pretty printing class. The parameter is used to set the maximum length of a text line in the output.

ModePP_TexPrinter();

Default constructor for the TeX pretty-printer. Creates a printer instance with a length initialized to 60 characters.

~ModePP_TexPrinter();

Destructor of the ModePP_TexPrinter class. Deletes all contained information.

ModePP_TexPrinter(**const** ModePP_TexPrinter&);

Copy constructor of the ModePP_TexPrinter. Does nothing in the release 1.0 of the module.

void PrintOSITexModule(ofstream*, const ModeFE_Module *);

Prints in a formatted way the module given in parameter to the stream given as a first parameter. Every information is printer to the same stream. The method generates a section for each type of template that is present in the module (managed object class, package, ...) and generates a subsection for each specification in a template type. In this subsection, the specification is formatted without a boundin-box.

The order of the printed templates is:

1. Managed Object classes,
2. Packages,
3. Attributes,
4. Attribute groups,
5. Name-Bindings,
6. Actions,
7. Notifications,
8. Parameters,
9. Relationship classes,

10. Relationship mappings

void PrintFileByFileTexModule(const ModeFE_Module *, **int**);

Generates one file per specification in the module. Each file contains the specification formatted either without a bounding-box (int = 0) or with a bounding box (int =1). The name of the file is built from the contained specification label extended with `.tex`.

void PrintRelationshipMapping(ofstream*, const ModeFE_RelationshipMapping *,**int**);

Generates the Tex output which corresponds to the Relationship Mapping given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintRelationshipClass(ofstream*, const ModeFE_RelationshipClass *, **int**);

Generates the Tex output which corresponds to the Relationship class specification given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintNotification(ofstream*, const ModeFE_Notification *, **int**);

Generates the Tex output which corresponds to the notification specification given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintBehaviour(ofstream*, const ModeFE_Behaviour *,**int**);

Generates the Tex output which corresponds to the behaviour specification given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintAttributeGroup(ofstream*, const ModeFE_AttributeGroup *,**int**);

Generates the Tex output which corresponds to the attribute group given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintAttribute(ofstream*, const ModeFE_Attribute *,**int**);

Generates the Tex output which corresponds to the Attribute given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintNameBinding(ofstream*, const ModeFE_NameBinding *, **int**);

Generates the Tex output which corresponds to the Name-Binding given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintParameter(ofstream*, const ModeFE_Parameter *, **int**);

Generates the Tex output which corresponds to the GDMO Parameter given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintPackage(ofstream*, const ModeFE_Package *, **int**);

Generates the Tex output which corresponds to the package given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintManagedObjectClass(ofstream*, const ModeFE_ManagedObjectClass *, **int**);

Generates the Tex output which corresponds to the Managed Object Class specification given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintAction(ofstream*, const ModeFE_Action *, **int**);

Generates the Tex output which corresponds to the action given in parameter. The output is send to the stream in parameter. Possible values for the type parameter (int) are:

- 0: no box around the specification,
- 1: the specification is encapsulated in a box.

void PrintModule(ofstream∗, const ModeFE_Module ∗, **int**);

Generates the Tex output corresponding to the module given in parameter to the specified stream. Possible values for the type parameter (int) are:

- 0: no box must encapsulate a specification
- 1: each specification is encapsulated in a box.

Specifications are generated in the following order:

1. Managed Object classes,
2. Packages,
3. Attributes,
4. Attribute groups,
5. Name-Bindings,
6. Actions,
7. Notifications,
8. Parameters,
9. Relationship classes,
10. Relationship mappings

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